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OBSERVATIONS AND EXPERIMENTS
ON THE
USE OF OPIUM, BROMIDE OF POTASSIUM, AND CANNABIS
INDICA IN INSANITY,

Especially in regard to the effects of the two latter given separately.

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So many cases of insanity consist of simple brain excitement, and in so many more is excitement the most distressing symptom, that if we could discover any agent which would subdue this excitement, and at the same time not interfere with the improved nutrition of the brain which rest, tonics, and good diet will effect, and on which complete recovery of its normal functions depends, such an agent would be a most incalculable blessing. There are many cases in which a physician knows that if he could tide over his patient for a few weeks of excitement, that recovery would come as the natural termination of the attack. Much distrust of strong narcotics prevails among the profession since Dr. Anstie's work on 'Stimulants and Narcotics' appeared. And yet how is such a case of maniacal excitement to be managed without them out of a lunatic asylum? The exact condition of the brain cells in mania being as yet quite unknown, we cannot apply a direct antidote. At best we can only work very empirically. But our empiricism may be founded on a rational and scientific examination of the effects of the drugs we use, and the natural history of the disease we treat, or it may be a mere haphazard employment of some agent recommended by some one who had no rational ground for his recommendation at all. Maniacal excitement is so essentially in many cases what has been hitherto called a functional disease, that it offers more hopes of benefit from drugs than most other complaints. A patient is rational and coherent in mind one hour and is furiously maniacal the next, and the excitement passes off as quickly. Surely such a condition may be reached and remedied by some therapeutic agent. We have many drugs more or less "narcotic" and "sedative," but hitherto the effects of those drugs have been far more carefully studied when given to persons previously free from excitement, than when given to those acutely maniacal. I do not mean to undervalue the observations which have been made on this subject, but all physicians know and strongly feel the want of accuracy and definiteness which prevails in this department of medicine. The following observations were undertaken almost entirely with the view of obtaining a little more accuracy in my own knowledge of the effects of certain medi-

¹ *The Essay for which the Fothergillian Gold Medal for 1870 was awarded by the Medical Society of London.*

cines on maniacally excited patients. They consist of two parts: the first, experiments made chiefly on incurable patients in whom simple brain excitement existed; the second, clinical observations on the effects of the same medicines on recent and curable cases of excitement. The experiments were undertaken to show, first, the effects of single doses, and second, the effects of long continued courses of the medicines.

The action of the bromide of potassium in cases of maniacal excitement especially deserves careful study. It acts differently in many respects from most of the vegetable narcotics. Given along with at least one of them, it seems to intensify and prolong its effect on the nervous system, without at the same time affecting injuriously the digestion and the nutrition of the body. The investigation of this point will be one special object of this paper.

The action of opium on disordered function of the cerebrum is better known than that of any other drug, though very much remains to be accurately ascertained. So much confusion exists as to its physiological action on a healthy subject, and its therapeutic action on a diseased one, so little is really known as to the tolerance of the remedy in certain disorders of the brain, there has been such a tendency to apply Dr. Anstie's theory as to the identity of narcosis and brain paralysis, where it is quite inapplicable, that any carefully recorded facts bearing on any part of this subject must be of value. Then the action on the healthy brain of a pure stimulant, such as whisky, has been carefully studied, but observations on the tolerance of large doses of such a stimulant in disordered brain functions are much needed. Any effect which food has in such cases we are accustomed to regard, and I believe truly, as beyond question directly towards health. To compare the effects of these various drugs with the effects of a highly concentrated food, therefore, on a given number of cases of brain disorder, can scarcely fail to be instructive.

Effects of single doses.—To ascertain the effects of single doses I at first selected eight patients (four men and four women), all labouring under great excitement, and from two hours and a half to three hours after breakfast, after taking their pulse and temperature and noting their mental state, I gave to each of them the dose of the drug or stimulant I was experimenting with. They were then sent out in the open air, from which they had been taken in, except the day was very cold, and in that case they were kept in the house, and in an hour I again took their pulse and temperature, and noted their mental state. Their condition during the afternoon was also observed. The next day I gave another drug, and this was continued till all had been gone over, when I began again, repeating the experiment four times, with most of the substances used, and twice with the others. I gave these patients in this way drachm doses of tincture of opium, drachm and two drachm doses of bromide of

potassium, drachm doses of tincture of cannabis Indica ('British Pharmacopœia'), and a mixture containing one drachm of bromide of potassium, and one drachm of tincture of cannabis. I performed the same experiments, only instead of the medicine giving each patient four ounces of good Scotch whisky one day, and a pint of beef tea made from a pound of good beef another. I made experiments on myself and my assistant, using smaller doses, and not repeating them so often.

The reason I did not keep the patients in the house in a room of a uniform temperature was, that I wished to see the effect of the various substances on them in their ordinary circumstances at that hour. Two of them I did keep in a bedroom of uniform temperature during most of the experiments, but I found that this did not materially alter the results. I was not able to continue the experiments on all the patients continuously, on account of some of them being free from excitement on certain days, and other causes. On such days I usually substituted other patients who were also excited. They laboured under the most various forms of mania, but the element common to all of them was great excitement and disorder of the functions of the brain. None of them laboured under any bodily disease.

My objects were to ascertain accurately the effect of single doses of each medicine on, 1, the maniacal excitement; 2, the appetite; 3, the temperature; 4, the pulse, and to compare them with each other, and with the effect of a pure stimulant in large doses, and the most concentrated and nourishing of food. It is not surprising that I found the results with each drug were not the same in each patient in the successive experiments. A maniacal patient is so changeable and uncertain in his state with or without medicine, he varies so much as to the amount of muscular exercise he takes, and his whole system is so affected by these variations, that one cannot wonder at anomalies in the experiments on particular days. It was to obviate these uncertainties as much as possible that I took so many patients labouring under various forms of excitement, and repeated the experiments so often. In that way, I think, the results may be re-

TABLE I.

Substances given.	No. of Patients.	No. of Experiments.	Excitement aggravated at first.	Excitement subdued.	Excitement not subdued.
Tinct. Opii	9	29	2	19	10
Potas. Bromid. and Tinct. Can. Ind.	8	29	5	26	3
Potas. Bromid.	7	13	0	7	6
Tinct. Can. Ind.	7	15	0	12	3
Whisky	10	21	13	14	7
Beef tea	9	15	0	1	14

garded as trustworthy as to the *general* indications they give. I shall endeavour now to summarise the daily observations which I made.¹

Excitement.—The effect of any medicine on maniacal excitement cannot be at all so exactly measured or defined as its effect on the temperature or pulse. The general and decided effects of the drugs I gave I have shown in Table I. From this it is seen that the combination of bromide of potassium and tincture of cannabis subdued the excitement in the greater number of cases, and certainly its effects were more patent and lasting than any of the others. Of the twenty-nine times in which it was given it decidedly subdued the excitement on twenty-six occasions, or in 90 per cent. of them. Opium was the next drug in potency of effect, though it only subdued the excitement in nineteen of the twenty-nine experiments, being 66 per cent. The bromide of potassium alone allayed excitement in about one half the experiments in which it was used, but its effects were very much less decided in the extent to which it allayed the excitement. Its effects usually lasted, however, for the remainder of the day on which it was given. In one half of the experiments two drachms were given, and this dose it was which had the effect on the excitement in five of the seven experiments in which any effect was observed. The Indian hemp produced abatement of the mania in twelve out of the fifteen experiments, but in almost all these cases its effects were comparatively slight, and seldom lasted for more than three hours. The whisky was followed by marked cessation of the excitement in fourteen out of twenty-one experiments, and its effects, contrary to what might have been expected, lasted usually for seven or eight hours. The beef tea had no appreciable immediate effect on the maniacal excitement in most cases. In only one case did a patient become more free from excitement after getting it, and this was the weakest of the number.

In regard to the length of time each drug took to act, and the mode of action of each, I found that the sedative effect of the opium was got most speedily. Aggravation of the excitement previous to the sedative effect was observed five times in the case of the mixture of the bromide and cannabis Indica, twice in the case of opium, and thirteen times in the case of the whisky, and this aggravation was so great and troublesome in the case of the last as to put it out of the question as a sedative for maniacal excitement. The sedative effect usually began to appear in from half an hour to two hours after the mixture of bromide and cannabis Indica, though in some of the experiments this was delayed for three hours. The preliminary stage of aggravation, when it occurred, lasted for about two hours in the case of the drugs, and for about one hour and a half in the case of the whisky.

¹ The daily records themselves were appended to the original essay, but they are too long for insertion here.

It was only the milder cases which were affected by the bromide or the cannabis Indica separately ; the opium and whisky affected some of the worst cases at times, while the combination of the former affected the most excited on the largest number of occasions.

A very striking fact is seen at a glance at the records of the observations themselves, and it is the extreme *uncertainty* of action of almost all the medicines on successive days on the same cases. One day the drachm of Tincture Opii subdued the excitement and caused no loss of appetite. Another day in the case of the same patient the same dose was followed by no such effect at all. It is this which renders any such therapeutical inquiry so apparently unsatisfactory, but which gives additional value to any drug whose effects are most free from this element of uncertainty. It shows how many things have to be taken into account, and how very many accurate observations will have to be made before anything like reliable generalisation can be attempted. We can only at present follow the *prevailing tendencies* of action of a drug.

In none of the experiments, even when the patient was most fully under the influence of any drugs, was there anything like a narcotic action. The nearest approach to this was the drowsiness and sleep that sometimes occurred. But it seemed quite natural sleep. It would surely be a misnomer to apply the word "paralysis" to any result of those drugs in these cases. If an acute maniac is talking incoherent nonsense and moving about incessantly, his reasoning powers and intelligence being in abeyance, and if after a dose of bromide of potassium he ceases to talk and move about so much—all the other functions of the nervous system being undisturbed—and he makes some nearer approach to reason or intelligence, we must find some other name than either "narcosis" or "paralysis" for such a result. Dr. Anstie implies that the effect of a large dose of opium on maniacal excitement must be "narcotic." In the cases above related, the action was truly "stimulant" in his sense, though the doses were "narcotic doses."

As regards the food action on the excitement, it was in all these cases so inappreciable at the time that no comparison can be made

TABLE II.

Substances given.	No. of Patients.	No. of Experiments.	No. of times appetite taken away.
Tinct. Opii	9	29	7
Potas. Bromid. and Tinct. Can. Ind.	8	29	1
Potas. Bromid.	7	13	0
Tinct. Can. Ind.	7	15	1
Whisky	10	21	1
Beef tea	9	15	0

between it and the drug action as regards immediate effect on the excitement.

Appetite.—No effect of a drug is more important on a maniacal patient than its effect on his appetite for food. If that is much interfered with, the good effects of the medicine will have to be great and manifest indeed, to counterbalance so indisputable an evil.

I have in Table II shown the number of times in which the patient's desire for food was clearly interfered with after each medicine given. Opium stands in bad pre-eminence at the head of the list as that which most frequently produced this result. In seven out of the twenty-nine experiments with opium, the patients could not be got to take the next meal. This was never the case after bromide of potassium at all, and only once after cannabis India and its combination with the bromide. This was one of acute excitement, with complete incoherence and absence of reason, being that most like the acute delirium of fever. In his case it caused on two occasions dryness of the tongue and lips as well as loss of appetite.

Temperature.—The temperature of the body in maniacal excitement has been far too little attended to. It often rises in a direct ratio to the brain excitement present, it is most important as a diagnostic of organic disease, and it affords most valuable indications for treatment in many cases. In Table III I have recorded the results of my observations in regard to temperature. The tendency of opium was to raise the temperature slightly; that of the bromide and cannabis India combined to depress it; of the bromide alone to raise it rather more than opium; of the cannabis India alone

TABLE III.

Substances given.	No. of Patients.	No. of Experiments.	Average Temperature.		Average gain in each experiment.	Average loss in each experiment.
			Before medicine.	After medicine.		
Tinct. Opii	9	29	97·6°	97·8°	·2°	...
Tinct. Can. Ind., Potas., and Bromid. }	8	29	98°	97·7°	...	·3°
Potas. Bromid.	7	13	98·1°	98·4°	·3°	...
Tinct. Can. Ind.	7	15	97·5°	97·6°	·1°	...
Whisky	10	21	97·9°	97·3°	...	·6°
Beef tea	9	15	98·16°	98·14°	...	·02°

to raise it very slightly; of the whisky to lower it most of all, and of the beef tea to lower it in the most trifling degree possible. It must be remembered that the temperature of the body in such maniacal patients is higher than in health. I think we must look on the action of opium, bromide of potassium, and tincture of cannabis, therefore, in this respect, as being away from the healthy

standard, while that of a mixture of the bromide and tincture of cannabis is in the opposite direction. There can be no doubt about the lowering of temperature caused by the whisky being too great. Its effect in this direction was almost uniform in nearly all the experiments. Even when it aggravated the excitement at first, and there was much more muscular motion, the temperature was usually found lower. A loss of 2.3° in the temperature of the body in an hour (when that temperature had not been very abnormally high to begin with) means devitalization, and that was the case once after the whisky. We may fairly in this case, then, take the effect of the beef tea as our standard of what we might expect from a drug which most readily approached the reparative action of food. The effect of opium was in the wrong direction altogether; that of the mixture of the bromide and cannabis Indica in the right direction, but perhaps going too far; and of the whisky in the right direction, but going too far.

The different effect of the mixture of the bromide of potassium and the cannabis Indica from each of them given separately is worthy of notice, as it confirms my experience that in all respects this mixture acts differently from either of its constituents.

The effects of smaller doses on my assistant and myself differed from those above mentioned in the bromide lowering the temperature, the cannabis Indica raising it considerably, and the mixture of both raising it very slightly, while the beef tea also raised it slightly. The lowering of the temperature by whisky was very marked.

TABLE IV.

Substances given.	No. of Patients.	No. of Experiments.	Pulse before getting medicine.	Pulse after getting medicine.	Average gain in each experiment.	Average loss in each experiment.	No. of times pulse decidedly irregular, or intermittent.
Tinct. Opii	9	29	85	84	...	1	3
Potas. Bromid. and Tinct. Can. Ind.	8	29	84	95	11	...	7
Potas. Bromid.	7	13	83	79	...	4	1
Tinct. Can. Ind.	7	15	83	89	6	...	3
Whisky	10	21	81	82	1	...	0
Beef tea	9	15	80	79	...	1	0

Pulse.—In Table IV the effects of the different substances on the pulse are seen. That of opium was to lower it to a most trifling extent. The bromide did so in greater degree, and the beef tea about the same extent as the opium. The tincture of cannabis Indica, on the other hand, caused an average increase of eleven beats, and the tincture of cannabis alone of six beats. The tendency of the mixture was also slightly to lessen the force of the pulse; and as is seen from

the table, to cause irregular action to a greater extent than opium. In seven of the twenty-nine experiments an irregular or intermittent pulse followed a dose of this mixture, while in only three of the twenty-nine was this the case after opium. It is known that cannabis Indica quickens the action of the heart; but why the bromide, which itself tends to reduce its action, should actually strengthen the accelerating action of the cannabis, is only explicable by the theory that all the effects of the latter are greatly added to by giving it with the former.

On myself and my assistant the effects of smaller doses on the pulse were the same as the results shown in the table.

Taking all the effects of these medicines into account, I think the balance of good is decidedly on the side of the mixture of bromide of potassium and cannabis Indica. The greater certainty and longer duration of its sedative effect on the excitement, and the absence of any bad effect on the appetite, are good results which are not materially interfered with by its action on the heart.

In regard to the dose of bromide of potassium, which is equivalent in sedative effect to opium or henbane, it is very difficult indeed to come to an exact conclusion. If there is much excitement, no single dose of the bromide up to two drachms will be at all equal to one drachm of the tincture of opium. To produce sleep in milder cases my experience is, that one drachm of the bromide will have the same soporific effect in most cases as half a fluid drachm of laudanum, or two drachms of the tincture of hyoscyamus. With regard to the dose of a mixture of the bromide and tincture of cannabis, which will be equivalent to laudanum, I have had more experience. The experiments as to single doses throw some light on this, and in many other cases I have given the two medicines alternately to see the effects; while in others, to whom I now give the bromide and tincture of cannabis to allay excitement, I used formerly to give opium, hyoscyamus, and tincture of cannabis alone. In only two out of thirteen cases did I find one drachm of the bromide with one drachm of the tincture of cannabis to have a less sedative effect than one drachm of tincture of opium. In two cases its effect was about the same, and in the other nine it was unequivocally more decided, while in two it was more decided than ninety minim doses of the laudanum. My experience has been, that about forty-five grains of the bromide, along with forty-five minims of the tincture of cannabis, will have the same sedative effect as a drachm of laudanum. In one violent case of periodic mania, with whom opium did not agree, I find that drachm doses of the bromide, and a drachm of tincture of cannabis, have rather more than the same effect as half-ounce doses of the tincture of hyoscyamus, and that by adding drachm doses of the bromide to one drachm of the tincture of hyoscyamus, the same sedative effects were produced, or by half-ounce doses of the latter alone. In another

ease drachm doses of each of the bromide and cannabis have as much effect as six drachms of the tincture of hyoseyamus. In another case half-drachm doses of each of the former have about the same sedative effect as two-drachm doses of the latter.

The experiments with single doses which I have related quite bear out my previous experience as to the decided increase in the effect of a combination of the bromide and the Indian hemp over the effect of either of them used separately. Over and over again I have found that half-drachm doses of each were more powerful than drachm doses of the tincture of cannabis, or than two-drachm doses of the bromide. This seems to me one of the peculiarities of the bromide of potassium, that, combined with a sedative drug, it powerfully increases the usual effect of such drug. I cannot speak so certainly of this effect when combined with opium, but with hyoseyamus and Indian hemp it is most decided. In my own case, the effect of fifteen minims of tincture of cannabis along with half a drachm of the bromide was very much stronger than half a drachm of the former alone, and incomparably stronger than a drachm of the latter. In very many cases I have given a combination of the two medicines where I had been giving sometimes the one and sometimes the other previously, and I have always found that half quantities of each combined were as powerful as double the amount of the cannabis, and more powerful than double the amount of the bromide given alone.

It was one of the effects of Indian hemp specially mentioned by O'Shaughnessy in his first experiments with the drug, that it caused an increase of appetite, and I found that when giving the bromide of potassium to my epileptic patients, it increased their appetites. Certainly no sedative or narcotine drug that I have ever used in large doses in the case of maniacal patients affected their appetites so little as the two given together. In doses under a drachm of each I never saw any diminution of appetite at all, and in large doses it was only after a long time that I found the appetite sometimes lessened.

My own experience of the kind of effect produced by mixture of the bromide and the Indian hemp as distinguished from the effect of each of those taken separately when I took them myself was this. Half a drachm of the bromide produced a slight drowsiness in about an hour, which lasted for about two hours, but the effect was almost imperceptible. A drachm of the bromide produced a more decided drowsiness, and after about two hours a feeling of coldness and slowness of the pulse. Half a drachm of the tincture of cannabis produced in an hour a feeling of confusion and fulness in the head, then a sort of preternatural acuteness of hearing, then the impression of a great length of time between acts performed within a minute of each other described by Christison, and in two hours great drowsiness,

which lasted for four hours, leaving a feeling of confusion in the head and incapacity for continuous mental exertion. Fifteen minims of the same tincture along with half a drachm of the bromide, caused in an hour first a tingling in the calves of the legs, then numbness of the legs extending gradually all over the body, then confusion of ideas and the impression of lengthened time and sense of fear, then a tendency to jerking and unsteadiness of the muscles. In about two hours all these sensations became merged in a sensation of fullness in the head and great drowsiness, which lasted for six hours. Its effect was also strongly diuretic. It produced quickness and irregularity of the pulse for the first three hours. I do not attach very much importance to the experiments on myself and my assistant, as no true comparison can be made between a therapeutical and a purely physiological experiment. Curiosity alone prompted me to take the drugs myself.

Effect of the sedatives when given regularly for long periods.—Opium in large doses having been hitherto regarded as the most powerful, and in the majority of cases the most reliable sedative in uncomplicated maniacal excitement, I selected nine chronic maniacs, all labouring under great excitement of long duration, and on them tried the effect of opium given continuously for a length of time. I knew the natural history of the disease in them all, for they had all been under my observation for periods of from three to five years, with little or no medical treatment for long periods. I regarded them all as quite incurable. Whatever effects on the bodily health and organic functions the brain excitement could produce, had taken place, and they were nearly all, as it were, *in statu quo* as regards body and mind. I had no reason to suppose that any of them had such organic disease of the brain as softening, tumours, or any other progressively fatal lesion. In three of them there were remissions of the excitement at regular times, but the periodicity in each of them was regular and quite well known to me. My reasons for taking such cases were, first, that they were incurable, and therefore the experiment could not do any harm to them; second, that in them I had simple brain excitement in known amount, against which I could, as it were, match a sedative drug; and third, that in them I could observe the effects of that drug on the bodily functions, the temperature, the weight of the body, the pulse, &c., with the certainty that any changes that might occur were the effects of the drug, and were not happening in the natural course of the disease.

For a month I had these patients weighed every week, noting their weights, their morning and evening temperature, and their morning and evening pulse. Then for twelve weeks I gave them opium in the form of tincture opii of the 'British Pharmacopœia' in increasing doses, noting every week their mental state, their weight, temperature, and pulse. For the first two weeks I gave them twenty-

TABLE V.

Name.	Age.	Weight before taking opium.	Weight after taking opium.	Average morning tempera- ture before medicine.	Average evening tempera- ture before medicine.	Average morning tempera- ture after medicine.	Average evening tempera- ture after medicine.	Average morning pulse before medicine.	Average evening pulse before medicine.	Average morning pulse while taking medicine.	Average evening pulse while taking medicine.	Patients' mental state.
J. G. . .	61	lbs. 133	lbs. 123	97°	98°	97·8°	97·6°	77	89	93	71	Chronic mania; 4 years' dura- tion; excitement severe; no remissions; intelligence not quite gone.
E. M. . .	42	128	122	98·2°	97·7°	97·2°	97·6°	78	93	81	77	Chronic mania; 4 years' dura- tion; exacerbations, but not regular; mental powers very much impaired.
M. T. . .	34	148	140	98·6°	97·8°	98·5°	97·4°	74	74	82	73	Chronic mania; 10 years; re- gular periodic exacerbations; great excitement; mental powers not so much impaired as any of the others.
J. H. . .	26	134	127	97·8°	97·5°	97·5°	97·2°	100	77	91	74	Chronic mania; 10 years; mind much impaired.
C. M. . .	30	113	114	98·4°	97°	97·5°	97·5°	104	93	90	79	Chronic mania; 3 years; ten- dency to phthisis; great im- pairment of mental powers.
S. R. . .	35	116	103	96·9°	97·7°	96·6°	97·4°	81	78	80	71	Chronic mania; 4 years; great excitement and violence; mental powers considerably impaired.
E. S. . .	39	105	103	98·4°	97·7°	97·5°	97·6°	103	94	93	89	Chronic mania; 10 years; one lung tubercular; mind quite impaired.
Aggregate weights and average tem- perature and pulse		877	832	97·9°	97·6°	97·5°	97·5°	88	85	87	76	

five minims three times a day, for the next two weeks one fluid drachm three times a day, for the next eight weeks one fluid drachm and a half three times a day.¹ Of course the patients during all this time were in the same circumstances with regard to diet, clothing, and other conditions. The reason I kept up the drachm and a half doses so long was, that this is about the limit of the doses commonly used in mania, and I wished to ascertain the effects of such ordinarily employed doses. At the end of the twelve weeks the medicine was stopped. Of the nine I found that the opium caused such persistent sickness and total absence of appetite in two, that I could not continue it for more than a few days. There were only seven, therefore, in whom the experiment was continued to the end.

Excitement.—As regards the maniacal excitement, I found that in none of the cases did the twenty-five minim doses subdue it in any degree, and during the fortnight they took this dose there was no perceptible change in their appetites, weights, temperatures, or pulses.

During the fortnight they took drachm doses there was a very perceptible difference in the maniacal excitement in all of them but one, who at the time was passing through one of the regular exacerbations which characterised her case. In three of them there was a decided tendency to drowsiness through the day. In one case the partial subsidence of the excitement which characterised the first week did not last through the second, for by the end of it she was about as excited as ever. Five of them had begun to lose in weight, though the absolute loss was small, being only eleven pounds in the five. There was a slight fall in the temperatures of most of them.

When the dose was raised to a drachm and a half the excitement was very markedly lessened or altogether overcome in all of them. This effect was not lasting, however, in all the cases, for by the end of six weeks two of them were nearly as excited as ever, and the one who was subject to exacerbations had one of these during this period, and was almost as bad as when she was free from the influence of any drug. The most careful examination into the character of the cases did not show any reasons why one case should have been more and longer affected by the opium than another. To refer to Table V, J. G. and C. M. became almost as bad as ever when taking the medicine, and M. T., during one of the exacerbations of her malady, was but little affected by it. One of these patients was old, the other two young. In one case the mental powers were very much affected, in the other two not so much so. Two of them were robust, the third had a tendency to phthisis.

The results of the treatment in all of them are shown in Table V.

¹ They got the first dose of the opium at seven o'clock in the morning, and the temperatures were taken at half-past ten. I wished to avoid the immediate effects of a dose of the drug.

Weight.—They all lost weight while taking the large doses of the drug. In some of them the loss was considerable, in others trifling. The greatest loss was thirteen pounds, the smallest one pound. The aggregate loss in all the cases was forty-five pounds. The patients whose excitement was most subdued did not lose most, nor did they lose least. It may be thought that the total amount lost in weight by them all is very small indeed, but it must be remembered that all those patients had no doubt lost greatly in weight when they first became excited, and were mostly at the minimum consistent with such health as they enjoyed. The opposing tendencies of the excitement of the brain and the reparative powers of the food they ate had found their balance, as it were, in each of them, and the effect of the opium was to give some more strength than had previously existed to the exhaustive forces.

Temperature.—On comparing the average temperature of each of those patients when taking no medicine, and during the whole time they were taking the opium, we find (Table V) that in every one of them but one it was lower while taking the medicine. The actual fall in each case is seen to vary from 1° to $\cdot 1^{\circ}$ in the morning temperature, and from $\cdot 5^{\circ}$ to $\cdot 1$ in the evening temperature. The total amount of the loss of temperature in the seven was in the morning $2\cdot 7^{\circ}$, and in the evening $1\cdot 1^{\circ}$. This seems small and unimportant, but it must be remembered how much the permanent lowering of one degree of temperature represents of loss in vital energy and reparative action if it is already below the normal amount, and how much of good it may represent if it is above the natural standard.

The average temperature of those patients was higher than most other classes of patients in the asylum, and higher than the average temperature of forty sane persons who were employ es in the asylum, which I found to be $97\cdot 5^{\circ}$ in the morning, and $96\cdot 7^{\circ}$ at night. Was it not, therefore, a health tendency, this reduction of the temperature caused by the drug? To answer this we must take into account certain facts in regard to the temperature of the insane. I found from an examination of the temperature of patients labouring under all forms of insanity, that a high evening temperature, as compared with the morning temperature, represents a large mortality in the class where this exists. Any drug that would have a curative tendency must reduce the evening temperature. In the cases experimented on, it is seen that the reduction of the evening temperature is very slight as compared with the morning temperature of the patients, and that, therefore, the average evening temperature is relatively higher while they were taking the opium than when they were not, the difference between the average morning and evening temperature of the same persons was $\cdot 8^{\circ}$, the difference in those seven patients taking no medicine was $\cdot 3^{\circ}$, while the difference after they began to take the opium was nil. It seems to me, there-

fore, that taking the effects of the opium on the weight and temperature of the patients together, we must conclude that it lowered the reparative power of the body below the point at which it could, as it were, cope with the destructive tendencies of the brain excitement.

It will be clearly observed that my experiments, though pointing to ill effects that may result from the use of opium in maniacal excitement for short periods or in single doses, yet tend to show that those ill effects will probably only be slight at first. The necessity or the supposed advantage of temporarily subduing the excitement may be so great or so urgent in any particular case that the physician will decide to do so by opium, notwithstanding those risks.

Pulse.—The average frequency of the morning pulse with opium and without it does not show any constant result in all the cases. But if we look at the evening pulse we see that in every case it was lower after taking the opium than before. The pulse of a chronic mania is a most variable quantity, especially during the day, when there is much movement of the body, and the indications got from it are not much to be relied on. Taking all the cases there was a lowering of one beat in the general average of the morning pulse, and of nine beats in the evening pulse, the numbers being 88, 87, and 85, 76.

It will be observed that all those effects were the result of a continuous use of the opium in doses that were far from being narcotic in their effects. In no case did any comatose symptoms show themselves. Sickness was not caused in those patients who continued to take the medicine. In those whose excitement was allayed there was no torpor of mind or body produced so that they could not take their food or take their usual exercise. In regard to sleep there is no doubt they all slept very much better when taking the opium than before. The functions of the hemispheres of the brain were disordered, and this in all cases tends to impair or interfere with the healthy nutrition of the body, and opium when given continuously in the doses in which I gave it, whether as in some of the cases it seemed to allay the symptoms of the disordered cerebrum, or whether it did not do this, yet in all cases it still further interfered with the proper nutrition of the body, and pushed it one step further down hill in the direction of death.

The rise in temperature, which was the immediate effect of single doses of opium, was thus seen not to last when the drug was given continuously. The loss in weight among the patients is, no doubt, directly connected with the tendency observed in the experiments with single doses to interfere with the appetite for food. The element of uncertainty in regard to its effect on different cases was seen to exist when it was given continuously just as much as when single doses were given, and an explanation of this was as difficult in the one case as in the other.

In order to compare accurately the effects of a continuous course of a mixture of the bromide of potassium and cannabis Indica with that of opium, I discontinued the use of the latter in the cases of those seven patients, and waited till the same time of year came round as that in which I had made the preceding observations. I then, after having observed their mental state and weighing them, put them on half-drachm doses of each thrice a day, and continued this for a fortnight, but finding that the medicine was having an effect, and showing no signs of losing that effect, I continued its use for a fortnight longer. I then increased the doses to forty-five grains of the bromide and forty-five minims of the tincture of cannabis, and continued this for a fortnight, but as this was having a very decided and continuous sedative effect I could not safely increase the doses any more, except in one or two of the cases, to whom I gave a few doses of a drachm of each, and in whom the effects were decidedly too strongly narcotic to be long continued. I then reduced the doses to a half drachm of each. I found this treatment so beneficial to the patients that I have continued it now for about eight months, with a few days' intermission occasionally in all the patients. In the case of those whose excitement was periodic I gave it during the excited periods only. I have noted some of the results that could be tabulated in Table VI. They are shortly these:—

Excitement.—The half-drachm doses had the effect of allaying the

TABLE VI.

Name.	WEIGHT.				MORNING TEMPERATURE.		EVENING TEMPERATURE.		MORNING PULSE.		EVENING PULSE.	
	Before taking medicine.	After four weeks.	After six weeks.	After eight months.	Before taking medicine.	After six weeks.	Before taking medicine.	After six weeks.	Before taking medicine.	After six weeks.	Before taking medicine.	After six weeks.
J. G. . .	128	125	130	123	97°	96·1°	98°	97°	77	87	89	60
E. M. . .	130	128 $\frac{1}{4}$	131	134	98·2°	96·5°	97·7°	96·7°	78	86	93	82
M. T. . .	134	139	138	135 $\frac{1}{2}$	98·6°	98·7°	97·8°	98·2°	74	83	74	68
J. H. . .	126	122	122	124	97·8°	97·2°	97·5°	97·4°	100	110	77	80
C. M. . .	109	107 $\frac{1}{2}$	105	110	98·4°	98°	97°	97·5°	104	83	93	81
S. R. . .	106	106 $\frac{1}{4}$	107	108	96·9°	97·3°	97·7°	96·9°	81	77	78	67
E. S. . .	102	103 $\frac{3}{4}$	101	106	98·4°	98·2°	97°	98·4°	103	98	94	96
Aggregate weights and average temperature and pulse	835	831 $\frac{3}{4}$	834	840 $\frac{1}{2}$	97·9°	97·4°	97·6°	97·4°	88	89	85	76

excitement in all the cases but two. This was quite as strongly marked as the first effect of the drachm-doses of laudanum, and during the nine months it has been given there seems to be no per-

ceptible tendency to lose its effect. This is in most marked contrast to the manner in which the sedative effect of the opium was lessened or lost in a week or two. The effect of each dose is not so soon observed, but lasts longer than each dose of the opium, and is not so apt to cause an approach to narcotic drowsiness in any case. The patients look better, less as if they were under the influence of a narcotic drug, and more as if their maniacal excitement was naturally abated. The forty-five grain and forty-five minim doses were in one of the patients followed by a decided drowsiness and sluggishness, with coldness and paleness of the skin and weak pulse, and this was also the case to a greater extent with the drachm doses. But when the excitement was very intense indeed, even these doses were not followed by any such effects.

Weight.—For the first four weeks, and with the half-drachm doses, the aggregate weight of the patients diminished about four pounds, four having lost in weight and three having gained. It will be remembered that during the same period under the opium treatment they lost eleven pounds. Curiously enough nearly all the patients who lost under the opium gained weight under the other treatment. At the end of seven weeks the patients were beginning to gain in weight, so their aggregate weight was only one pound less than when they began the treatment, and now at the end of eight months their aggregate weight is five and a half pounds more than it was to begin with, five having increased, two diminished in weight, and one remained stationary.

Appetite, &c.—In no case was the appetite interfered with. At very rare intervals the mixture produced sickness in one of the patients. Their tongues all remain clean, and no constipating or purging effect on the bowels has been produced.

Temperature.—As seen in Table VI, the average morning temperature of the patients fell $.5^{\circ}$, and the average evening temperature $.2^{\circ}$. The latter result I consider as more favorable than the results of the opium treatment. Taking each patient separately, five of them fell in morning temperature, and four of them in evening temperature. There was no fall in the evening temperature relatively to the morning temperature, in this respect not being different from the opium.

Pulse.—The pulse was slightly increased in frequency in the morning and diminished in frequency at night (see Table VI), the diminution not being nearly as great as that caused by opium. In three of the cases the pulse was slightly weakened.

If we compare the general results of those two modes of treatment it is seen that the maximum of good effects and the minimum of those that are ill in their tendency were obtained by the use of the combination of half-drachm doses of bromide of potassium with thirty minim doses of the tincture of cannabis Indica.

It is interesting to compare the results of the two modes of

treatment I have described with the effects of bromide of potassium alone in large doses on the weight and pulse and temperature.¹ I had been giving it to twenty epileptic patients for thirty-eight weeks in doses rising from five grains three times a day up to fifty grains three times a day, with the following results. They gained steadily in weight for twenty-eight weeks, and their aggregate weight was then fifty-six pounds more than when they began to take the medicine. During the last ten weeks, when they were all taking 150 grains of the medicine per diem, they lost forty pounds. At the end of the time they were still sixteen pounds heavier in the aggregate than they had been to begin with. During the same time the effect of the medicine on their temperature was to lower it steadily until forty grain doses were reached. After that it rose, until at the end of the ten weeks of fifty grain doses it was above what it had been to begin with. Still the difference between the morning and evening temperature was greater at the end of the time than it had been to begin with. The effect on the pulse was to lower its average frequency steadily up to forty grain doses, and then to raise it slightly, but at the end of the time its average frequency was not so great as it had been to begin with. The patients who took the bromide of potassium being epileptics, the effects of the medicines above described cannot be compared with it with perfect precision, but still the general result holds good, that the tendency of the bromide of potassium was at least up to 120 grains per diem, in the direction of health, while from the beginning the effects of the opium were as regards the bodily state in a direction away from health, and the addition of the cannabis Indica to the bromide in the maniacal patients, while it had a good effect on the maniacal excitement, did not seem materially to interfere with the nutritive process.

It has been the result of my experience with bromide of potassium given either in epilepsy or in insanity, given alone or in combination with cannabis Indica, that there is a certain dose which may be given with perfect impunity as regards the general health, and with great benefit to the disease for long periods, and that if this dose is increased cumulative effects will show themselves, and all the symptoms of poisoning will come on. The safe and beneficial dose differs in different cases. It would seem as though the kidneys (through which the salt is principally eliminated from the system) can only carry away a certain amount in each individual. I have given twenty-five grain doses three times a day to seventeen epileptics for two years, with a break of only one week, and in only two cases did any constitutional symptoms show themselves, and that was not till the end of a year. The others are all much the better for the medicine, having gained in weight, and improved in general health.

¹ 'Journal of Mental Science,' Oct., 1868.

And when I put twenty-nine epileptics on the medicine in graduated doses, beginning with 15 grains per diem and ending with 150, only the twenty I have referred to stood this treatment for the thirty-eight weeks it was persevered in. At the end of eleven weeks, when they were all taking 75 grains per diem, a boy of fifteen showed signs of being "bromidized;" two men, at the end of seventeen weeks, when taking 105 grains, began to feel bad effects, and two others, at the end of eighteen weeks, with the same doses as the last, showed that the medicine was accumulating in the system. The same phenomenon we shall observe in the clinical observations which follow where the bromide was combined with Indian hemp. In some cases, drachm doses of each were given three times a day for weeks with good effects; in other cases, the same doses could not be continued for more than a few days. This I regard as one of the most important facts yet discovered in regard to the bromides. I have as yet been able to discover no fact by which we can predict beforehand that any particular case will stand large doses for a long period, or that another case will not do so with impunity. Until such a test is discovered we can only give them tentatively in gradually increasing doses in each case until we get up to the maximum of good result without any danger of the cumulative effects of the drug. My experience has been that a strong, vigorous patient, with all the functions of the body performed actively, will generally stand large doses for a longer time than a weaker patient: but to this I have seen exceptions. The salt being eliminated by the kidneys would point to giving a diuretic along with it in cases where it is considered of importance to give large doses, and yet not cause cumulative effects. Indian hemp has been much used as a diuretic. I have given some Spt. Eth. Nitrosi with each dose in such cases, but my experience on this point as yet has not been sufficient to enable me to express any conclusion as to the result.

To test the effects of bromide of potassium alone on acute maniacal excitement, I selected by far the most violent case of periodic mania in the asylum, a woman in whom the attacks of excitement had come on about every month or six weeks for two years, and lasted from a fortnight up to a month. She was a young strong woman in good bodily health. I had tried opium in this case, but it aggravated all the symptoms, and tincture of hyoscyamus in half-ounce doses thrice a day produced but slight abatement of the symptoms. On the occasion on which I made the experiment she became suddenly excited, on the 13th of March. On the 14th she was furiously maniacal, shouting, restless, sleepless, most violent and destructive, with a strong pulse of 90, flushed face, suffused eyes, muscular system in constant activity, and temperature 99.6° . I put her on two-drachm doses every three hours, on this the second day of her excitement. In forty-eight hours, after she had taken four ounces,

she was as excited as ever, but her tongue was beginning to get furred in the centre with a raw line down each side, and there seemed slight muscular unsteadiness. Her pulse too was somewhat weaker. The medicine was given for another day and a half, until she had got seven ounces of it. The maniacal excitement then quite suddenly abated, and her mental state became one of torpid depression. She became pale and pinched-looking, the pupils sluggish, the pulse 108 and very weak, and the temperature fell to 96° . These symptoms increased after the medicine was discontinued, until the co-ordinating power of the muscles was so completely lost that she reeled like a most intoxicated man when she attempted to walk. She slept, almost continuously, for three days. She only took food when given to her, and seemed not to care for it. Her bowels were regular. Her tongue was at first furred with a thick white fur, and then got quite raw-looking. Her breath smelt of bromide of potassium. Her articulation was much affected. She remained in this state for about five days, her temperature remaining at 96° , and it was quite a fortnight from the time it was discontinued before she got over the effects of the drug. As she got better there was slight feverishness with dry tongue and want of appetite. The excitement did not return when the effects of the drug passed off; but the next attack began on the 10th of April, which was sooner than it ought to have come on by a week at least.

This experiment is instructive, as showing, 1st, that the most acute excitement can be subdued by bromide of potassium; 2nd, that this cannot be done without pushing the medicine far beyond what is safe; indeed, almost up to complete paralysis of the cerebrum and sympathetic ganglia of the heart; 3rd, that the action of the drug in such a case is strongly cumulative, increasing in intensity for days after it has been stopped, and lasting for a long time; and 4th, that no permanent improvement is necessarily produced in the morbid cerebral action. I do not regard this a case of cutting short the excitement. It was rather one of half-poisoning the patient. If any justification of such an experiment is needed, I must plead the importance of knowing exactly the effects of the bromide on maniacal excitement, the hope that benefit might possibly accrue to the patient, and the absolute want of any precedent to guide me. It seems to me highly instructive, clinically as well as physiologically. Such a case should show the necessity for stopping the bromide at once when its bad effects are first observed, on account of this cumulative action. It illustrates the prolongation of the effects of this as compared with any other drug that has the power of producing the same narcotic or paralytic action on the nervous system. It proves that maniacal excitement gives the same tolerance to the system in resisting the ordinary physiological effects of this drug as in the case of the ordinary vegetable narcotics.

Clinical Observations.—The preceding observations and experiments having been undertaken chiefly with the view of obtaining more accuracy as to the immediate and remote effects of bromide of potassium and its combinations, as compared with opium, on maniacal excitement, and on the general health of patients labouring under excitement, I shall now record my experience of the effects of the salt and its combinations when given in the ordinary course of my medical practice among the insane. I began to give the bromide in a tentative manner in the end of 1867, and have continued to use it ever since. It had at that time been recommended for various forms of insanity in several of the home and foreign medical journals. My attention was first strongly directed to the powers of the salt in brain disorder by a case which I was treating in the beginning of 1868. I had amongst other things been giving both bromide of potassium and tincture of cannabis Indica to procure sleep in this case, which was one of melancholia, with great excitement and hallucinations, and by way of experiment I gave the patient a combination of the two. I found the effects to be so very wonderful in this case that I employed the bromide alone, and in conjunction with Indian hemp very largely thereafter in similar cases. I need scarcely say (the subject being therapeutics) that my first impression, that I had discovered a panacea for some forms of brain disorder, was disappointed, but I have found very good results from this combination in very many patients, and I shall proceed to give a summary and an analysis of my cases.

I have given bromide of potassium alone or along with Indian hemp in fifty-one cases of various kinds of insanity. I mean that in those cases I have given it a fair trial to relieve or cure the disordered brain function. I have used it in a more desultory way in many more cases, but of course such a mode of giving a drug is quite useless for any scientific purposes. As regards the forms of insanity to which my cases belonged I have put them in a tabular form (see Table VII). And in the same table I have distinguished between the cases in which its use seemed to be attended with benefit, and those in which this could not be said to be the case. The first important fact in regard to this table is (and it may be thought to be a suspicious one), that those forms of insanity which are well known to be most curable figure most largely among the benefited. Of course this might have been expected, but I exercised what care I could in each case, so that the effects of the drug might be distinguished from the improvement that must have occurred in many of those cases in the ordinary course of the disease. When a remedy is said to be very beneficial in such curable affections as acute mania, puerperal mania, and insanity occurring at the change of life in women, we must carefully test its real efficacy, if it is not to fall into the disrepute of those panaceas for measles, jaundice, and delirium tremens which our

fathers so strongly believed in. The table as it stands was the result of my first analysis of the cases, and I believe it to be so far correct, but in Table VIII I think I have excluded all possibly doubtful cases,

TABLE VII.

Form of insanity.	Seemed to do good.			Seemed to do no good.		
	M.	F.	Total.	M.	F.	Total.
Acute mania	6	1	7	...	2	2
Chronic mania	1	...	1	...	4	4
Periodic mania	4	8	12	1	...	1
Puerperal mania . . . .	...	9	9	...	1	1
Melancholia	1	2	3	...	2	2
Insanity at change of life . .	...	4	4	...	...	...
General paralysis	2	3	5	...	...	...
Total	14	27	41	1	9	10

and only claimed credit for the remedy where I had an opportunity of applying some crucial test, such as stopping the medicine, watching the progress of the disease without any medicine, and then giving it

TABLE VIII.

Form of insanity.	M.	F.	Total.
Acute mania	3	...	3
Periodic mania . . . .	...	4	4
Puerperal mania . . . .	...	2	2
Melancholia . . . .	...	1	1
Insanity at change of life . .	...	2	2
General paralysis . . . .	...	1	1
Total	3	10	13

again. I think that not even the veriest medical sceptic in this sceptical time would take exception to any of these thirteen cases. I shall presently quote some of the most typical of them. They were many of them obstinate examples of their respective forms of insanity, which had "defied other modes of treatment." If to a patient whom one has known to have had regular attacks of periodic mania for years, we give a medicine at the commencement of an attack, and the patient's

excitement ceases, contrary to anything known in the history of the case before, then I think we may fairly conclude that the medicine and the absence of mania are cause and effect. If in a case of mild melancholia at the change of life in a woman, the disorder has existed for a year and a half, if most of the remedies ever before recommended for that class of cases had been tried and had failed to do good, and if at last the bromide of potassium procures sound sleep, and immediate visible improvement in appetite, weight, and mental state, surely some credit may be given to it. But if in this same woman its use is intermitted, and all the symptoms at once return, and again immediate improvement follows its employment, so that the patient becomes able to employ herself as she never did before since her illness, and through healthy employment gains in flesh and strength, and gets quite as well in three months as ever she was in her life, surely we cannot deny to therapeutics a cure in the best sense of the term. Or if a cure cannot be expected, as in a case of general paralysis, if a mixture of bromide of potassium and Indian hemp so subduces intense excitement, that when not taking this medicine the patient is noisy, violent, destructive, sleepless, and rapidly losing weight, and when taking it he is quiet, semi-rational, dresses and eats properly, and remains in this state for six weeks, till the disease in its natural course passes into its quiet stage, I think here we have a palliative of great value and importance. Or if an old lady gets irrational, restless, sleepless, and unmanageable by her relatives, and if apparently the last alternative to sending her to an asylum has been tried and failed, until half-drachm doses of bromide of potassium and tincture of Indian hemp is found to subdue and quiet this irritability and restlessness, so that she can be quite well kept at home, for the month or two during which this excitement lasts, and until the ordinary dotage of old age to which this excitement was a prelude, comes on, surely the physician's power was augmented, and the patient was unquestionably the better for the remedy he employed.

In acute mania I seldom found the bromide given alone do any good, or, indeed, have any perceptible effect. I gave it in all doses up to 120 grains three times a day, and I continued its use in some cases for a few days. But when combined with tincture of cannabis Indica the effects of the mixture were in many cases very remarkable. Sometimes if the excitement was very intense I began with drachm doses of each three times a day, or, in some cases, every three hours for the first day. In the cases in which the effects were good, they usually appeared by the end of the first day of its use. The patients became less restless, the shouting and violence were abated, and at night they slept. The skin, too, which is so often dry in acutely excited patients became more moist, and they perspired freely. The pulse usually lost in force. Indeed, this is the only

objection I have to this mixture, that the force of the heart's action is undoubtedly lessened in most cases by it. But I have never seen a single case of syncope, except in one woman who fainted two hours after a dose, but soon recovered. The lessened force of the heart was shown, too, by the paleness of the face and skin generally. After the medicine has calmed the excitement the patient remains confused in mind. The intelligence and coherence of ideas, of course, do not usually return for some time. It is often sufficient if one or two doses per diem are given after the first day or two, and I have stopped its use altogether at that time—the patient remaining free from acute excitement. The greatest advantage of this sedative over every other that I have tried in acute mania was, that these patients took their food as well or better during its use as without it. Every one who has acute mania to treat knows that there are three great risks. The patient's appetite may fail, the excitement may cause complete exhaustion or death, or it may last so long that the power of the brain to become the medium of normal mental manifestations seems to be lost or impaired, and dementia results. There can be no doubt that the patients being got to take a large amount of nourishing food and stimulants is of the very first importance in all cases of acute mania, and it is the great risk of taking away the patient's appetite that prevents opium or henbane being more extensively used. Especially is this risk great if we give large doses of opium. It seems to me that the bromide and Indian hemp combined approached more nearly by far than any other drug to our great desideratum in treating acute excitement of the brain, viz. a medicine that will so alter or modify the morbid functions of the brain, that the patient will cease to exhaust all his bodily energy in muscular movement and constant wakefulness, and will at the same time allow the reparative effects of rest and food to act quickly in restoring the normal nutrition of the cerebrum. In some cases complete recovery of the mental powers took place very soon indeed after the excitement was subdued; in others, the confused and incoherent state remained for a long time. In the three cases I have put down in Table VIII the patients were rational or coherent or nearly so within a fortnight after getting the medicine, though one was of a month's duration; the excitement in each case being of about three days' duration after being put on the mixture. The cases in which the good effects are less marked are those in which the excitement is subdued, but the patients remain confused in mind, incoherent and suspicious, sometimes with delusions for periods varying from one to six months. The cases in which its use is followed by no particular benefit as regards cure are those (and in my experience they were rather the exceptions), in which it fails to allay the excitement except when given in very large and continued doses; and when after its use has been continued for a week or two

the excitement still remains as acute as ever if the medicine is stopped. If good effects are not manifested within a fortnight of treatment in a curable case of acute mania, my own opinion is that then the case should be left for a time at least to nature, with appetizing tonics and nourishment alone. In all the cases of acute mania where I say that the medicine did good, I mean that its effects were distinctly in the direction of health, and not merely that the symptoms were relieved. In some of those cases in which the best effects resulted from the use of the drug, I think that if it had been given at first the patients need never have been sent to an asylum at all. If my anticipations in regard to it are realised, this will unquestionably be one of the most important effects of the remedy. To be able to treat many cases of insanity, especially if attended with excitement, at home has been impossible just because we had no remedy that could safely be given to allay the excitement without the risk of interfering with the recovery of the patient. In the case of senile mania to which I referred, the patient was treated quite well at home. Some cases of maniacal excitement of short duration which now have to be sent to asylums will, I think, be saved from this by the use of the bromide and Indian hemp combined. There are few risks attending its use, and its good effects, if there are to be good effects, are so very soon seen and follow its use so manifestly, that there generally can be but little question of mere coincidence.

In these forms of maniacal excitement which have hitherto been found to be incurable, the bromide of potassium and its combinations are no more powerful than other drugs have been found to be in effecting cures. But in many of those cases its effect is to modify the symptoms of the disease so much that the lives of the patients become far more tolerable to themselves and others. In chronic and periodic mania, I have given the bromide combined with Indian hemp in eighteen cases, and it produced good effects in thirteen of these. In four cases of periodic mania to whom I gave it, the effects were, perhaps, more wonderful than in any others, because the patients had all confirmed excitement of a severe character; the history of their previous attacks was known, and could be contrasted with their attacks when getting the drug. In three cases the effect of the drug was to cut short an attack when it was coming on in its ordinary course as it had come on before. In two of the latter the attack was only postponed, as it were, but in the third case the patient remained well, was discharged from the asylum, and has kept well for twelve months—a far longer period than she has ever been free from excitement before for five years. I shall relate the case more fully afterwards. The other two were not so striking, but still are curious. One was a woman who had in her youth taken epileptic fits. After these ceased she became subject to severe attacks of excitement, which came on about every two months, and

lasted for a fortnight. At the beginning of one of these attacks I gave half-drachm doses of bromide of potassium three times a day, and the excitement ceased within twenty-four hours. The patient continued to take the medicine for two months and got better mentally than she had been for several years. It was discontinued to see if the effect was permanent, but an attack of excitement came on at once, and the medicine, though it has since controlled and modified such attacks, yet has never quite stopped them. Another case was that of a woman who for a long time had had an attack of acute excitement every three or four years, the attack usually lasting from six months to a year. She became suddenly maniacal, and got at first drachm doses of bromide thrice a day without any good effect, then half-drachm doses combined with half-drachm doses of tincture of cannabis, but still the excitement was daily getting more intense till she was incoherent, noisy, sleepless, dirty in her habits and violent. The quantity was increased after a few days to forty-five grains of the one and forty-five minims of the other every three hours, with the effect of completely allaying excitement, so that in two days she was removed back to the convalescent ward, remained rational, industrious, and apparently well in mind for a week, during which time she got no medicine. At the end of that time the excitement began again, and is now running its usual course; its symptoms, however, being wonderfully controlled by forty-five grain doses of the bromide with forty-five minims of tincture of cannabis twice or three times a day. She has taken this for three months, and though far from coherent or rational, yet sleeps, and is not destructive or dirty or violent, as she used to be and is now, when the medicine is stopped. She has lost in weight very much, but takes her food well. The comparative loss in weight as compared with former attacks I am not able to say, as she was not weighed in the different stages of former attacks.

Another case is that of an old woman who has taken periodic attacks of mania for at least twenty years, and has been so much better during her last attack under the use of drachm doses of the bromide and tincture of cannabis morning and evening, that she has been kept in the infirmary ward of the asylum during the nine months the attack has lasted, and has during that time slept in a dormitory with other patients, has taken her food, and is now passing into the quiet stage of her disorder. In every attack which had occurred before, she had been destructive, dirty, very noisy, and had to be all the time in the refractory ward.

In one or two cases of very severe excitement the attempt to suppress it by often repeated doses of the medicine has seemed to do harm. The patients got into a state resembling acute dementia, and their nutrition was much interfered with. In one case to which I referred, where the person was old, very weak, and the pulse very

thready, she once fainted after getting a drachm dose of each, but she very soon revived.

The forms of insanity in which the bromide or its combination with Indian hemp did most good were puerperal mania, and that form of mild insanity which occurs at the change of life in women. I used it in ten cases of puerperal mania, and in four of such climacteric insanity (see Table VII), and in all except one its use was attended with benefit. In two cases of puerperal mania, both very violently excited, the employment of forty-five grains of the bromide with forty-five minims of tincture of cannabis three times a day was followed almost at once by alleviation of the excitement, and in about a month by recovery. In another case of puerperal mania of three days' duration, and of the most violent character, I gave drachm doses of each every three hours, with the view of cutting short the excitement at once, and in two days the excitement was quite subdued, but the patient remained stupid and vacuous in mind for a fortnight (taking her food quite well, however, during that time), and though now, after three months, quite coherent, industrious, and rational on most subjects, yet is suspicious, and has some delusions. I do not think I should again give the medicine in such a case in quite such quantity, but rather endeavour to allay the excitement a little more gradually. I am quite sure, however, that to have subdued the excitement in that way with any other drug I know would have been followed by total absence of appetite, dry tongue, and much feverishness.

In five of the cases where the excitement was milder, and where the chief characteristics of the disorder were sleeplessness, restlessness, delusions about husband and children, reduced bodily condition and impaired appetite, I found drachm doses of the bromide given every night procured sleep, and seemed also to increase the appetite, and allay the restlessness and unsettledness of mind, and the patients recovered sooner than my experience of similar cases would have led me to expect without the medicine.

In the cases of insanity at the change of life in women, I found that drachm doses of the bromide alone at night was most beneficial in procuring sleep and allaying the restless depression that usually accompanies this form of aberration. In one of these I had tried opium most carefully, and it had failed to do any good, while the use of the bromide was at once followed by much benefit, and its continued use by complete recovery in two months.

I have given the bromide of potassium alone and in combination with the Indian hemp in five cases of melancholia, and with slight benefit in three of them, but with decided benefit in only one case, and that I shall afterwards relate. In ordinary melancholia the bromide does not do much good, except by procuring sleep, and combined with cannabis it often seems to do harm. If there is much

restless excitement, with hallucinations of hearing, they may do good, not otherwise.

The last form of insanity in which I have used the mixture of bromide and cannabis is general paralysis, and of course in that most fatal of diseases I merely expected, and only got, palliative results. But in no disease is a good palliative of the symptoms in the worst cases of more real value, especially in an asylum, and after my extensive trials of opium (the worst of all in this disease), henbane, digitalis, Indian hemp alone, and bromide of potassium alone, I have found the mixture of the two latter, given in doses of from half a drachm to a drachm of bromide with a drachm to a drachm and a half of the former, to be the safest, surest, and most manageable in its effects. All physicians who have had experience in the wards of an asylum know that of all cases of insanity a general paralytic in the first or beginning of the second stage of the disease passing through the period of excitement which often occurs then, is by far the most difficult to manage. In most other forms of maniacal excitement is there some faint approach to self-control or amenability to control by others, but in this the noise, the violence, the destructiveness, the entire absence of any sort of fear of consequences in annoying fellow-patients, the sleeplessness and restlessness, are simply unmitigated and incessant. An ordinary maniacal patient may generally be taken by an attendant and walked about in the open air, but an excited general paralytic fights and struggles until he or his attendant gets injured in some way. It can be imagined what a boon for such a case, for his attendants and for his fellow-patients, it would be to have some sedative medicine which would somewhat allay his violence and yet not interfere with his appetite until the period of excitement was tided over. Such cases are notoriously intolerant of opium; henbane has been hitherto most relied on in half-ounce and ounce doses of the tincture, but if long continued it causes dryness of the mouth and lips, and loss of appetite; digitalis has been strongly recommended, and in some cases its effects are admirable, but there is a wide-spread mistrust among those who have used it much that it is not a safe drug to give in all cases—one patient poisoned, or nearly so, by it, causes an excusable timidity in using it in most minds, and it is surprising how many asylum physicians have this timidity.

I have given the bromide and Indian hemp to five cases of general paralysis in the most excited and worst stage of the disease, and in all of them I found the worst and most troublesome features of the excitement abated, without causing much loss of appetite. In one case of most violent excitement I was giving ninety-grain doses of the bromide with ninety minims of the tincture of Indian hemp for weeks, and the patient's tongue got thickly coated, the appetite was impaired, he became very sleepy, and all the other features of "bromidism" showed themselves. But this I attribute entirely to the

large doses of the bromide so long continued. I do not think that the doses of this should exceed a drachm, or even forty-five grains if it has to be given three times a day and *long continued*. The great advantage of this mixture is that single doses will *never* do any harm, nor is there the least risk in going on with it for a few days; and that any bad effects come on gradually, and can be observed before any harm whatever is done to the patient. By lessening the doses of the bromide, the bad symptoms at once disappear. In one case of most violent general paralytic excitement I gave forty-five-grain doses of the bromide and forty-five minims of the cannabis morning and evening for many weeks, the patient during that time working out on the farm, sleeping at night, and behaving rationally, while if it was stopped for two days he got noisy, dirty, violent, unable to do any useful work, and quite maniacal. He quietly passed into the second stage of the disease, when the medicine was no longer required. In general paralysis in women it is most useful in half-drachm doses of each. If used in the end of the second or third stages of general paralysis it subdues excitement in small doses, but it increases the want of co-ordinating power of the muscles. Especially is this seen in the patient's walk. I have seen a drachm dose of each quite take away the power of walking for a day in a general paralytic who had previously been rather shaky on his legs. It does not in any way affect the peculiar delusions of general paralytics. When a patient is beginning to be excited, he should get one drachm of each at bedtime, and then half-drachm doses should be tried every three hours next day, or until the excitement is in some degree subdued. It will then be sufficient to give one dose in the morning and another at night in many cases, or at most three times a day. If the tongue gets much furred after using the medicine long it will be quite sufficient to stop its use for a few days.

I shall now give an abridged account of a few of the cases in which I employed either the bromide of potassium alone or along with Indian hemp.

Acute mania.—W. B—, æt. 18, a boy who had been insane for three months, but whose symptoms had become gradually worse until he had become quite maniacal.

On admission he was a small, ill-developed youth. He was quite incoherent, restless, violent, and destructive. No bodily disease. Temperature, 95°. Pulse, 80. Conjunctivæ suffused; right pupil more dilated than the left. Tongue slightly furred. He was quite sleepless. He was ordered half a drachm of bromide and of tincture of Indian hemp three times a day. The excitement was evidently lessened after each dose. He took his food well, and on the fourth day after admission the excitement became greatly more subdued, and his mental condition one of confusion of ideas and stupidity. The medicine was then stopped, and in a week he was

coherent and rational, and rapidly gained in weight. In two months he had a very mild subacute attack for a few days, but has since then (six months) kept quite well.

Acute mania.—J. P—, æt. 27, a man who had been insane for a week. The maniacal excitement had come on suddenly, and after it commenced he was sleepless, restless, incoherent, and most dangerous. He tried to cut his mother's throat, and tore out all the windows out of a gentleman's dining-room. Maternal grandfather insane.

When admitted was in mechanical restraint (as he had been since attempting his mother's life), and was confused and suspicious looking, though partially coherent. He was a robust, healthy looking man, of 6 ft. 1 in., very strong, and his bodily functions all performed normally. He got worse mentally until in two months he was quite deliriously maniacal. He tried to choke everyone near him, sometimes making attempts on his own life, once very nearly killing both an attendant and himself. He was sleepless, his tongue got furred, and he had frequently to be secluded in a strong room for a day or two at a time. Hyoscyamus, opium, antimony, and stimulants were all tried in vain. He had the "ear of the insane" in October, and after that gradually got more quiet, till in the following January, a year from the time of his admission, he was rational, coherent, industrious, and quite free from excitement, though a little silly in mind. In the following September he suddenly took a violent fit of excitement when attending a concert one evening, and became as violent, dangerous, and incoherent as ever. He was at once put on drachm doses of the bromide with ninety-minim doses of tincture of cannabis, three times a day. In two days he was free from excitement to a great extent, and continued to get the medicine in half the above quantities. For the three months the excitement lasted he never required to be secluded, he worked on the farm regularly, he took his food, he exhibited none of the suddenly dangerous and violent paroxysms which characterised his former attack, though if the medicine was stopped he at once showed signs of being violent. The attack passed off, and he remains now free from excitement.

I think this case will have periodic attacks of excitement all his life, but after my experience of the power of bromide and Indian hemp to subdue the worst symptoms, I do not look forward to the coming on of the next attack with the anxiety and dread which I should have felt (and did feel when the second attack began) had I not known of this safe and powerful sedative.

Periodic mania.—H. S—, æt. 23. This young woman has had six attacks of mania in four years. She had been insane for four weeks previous to admission. All the attacks had begun during menstruation, and while maniacal she was always very erotic, especially at the beginning of the excitement. She was violent, inco-

herent, noisy, dirty in her habits, and 'sleepless before admission and for about three months afterwards. She then got well, but in six months had another similar attack of mania lasting for two months. She lost twenty-eight pounds in weight during this attack, and her temperature was always 1.5° above its normal rate when she was excited. She remained free from excitement for nine months, and then had another similar attack. After four months of sanity she one night suddenly got up, smashed the windows of her dormitory, saying that the devil was looking in, and became violently excited, her temperature that day being 100.8° , pulse 108 and strong. She was ordered drachm doses of the bromide every three hours with a drachm of ammoniated tincture of valerian with each dose. She was put into a dark room at her own suggestion. On the following day her temperature was 99.6° , and her pulse 108. She was still much excited, but not so much so as on the day before. On the second day her temperature was 99.3° and her pulse 130 and weak, the excitement being much allayed. The medicine was after this given only three times a day. She was kept in bed for a fortnight in a dark room, as she said that if she got up she would get worse. At the end of that time she was still rambling, partially incoherent, and full of delusions, but nearly free from active excitement, and the medicine was discontinued. She remained slightly affected in mind for another fortnight. At the end of a month from the day the excitement began, she was well, and was discharged from the asylum six months thereafter. I heard a few weeks ago that she was still keeping well, and it is now a year from the time her attack of mania was thus cut short (as it seems to me) by bromide of potassium. I gave the valerian because she was beginning to menstruate at the time the mania began.

It will be observed that the excitement in this attack only lasted about three days, and she had never been less than two months excited at a time in her nine previous attacks; the aberration of mind was only of a month's duration, it had never been less than between three and four months previously, every symptom of an ordinary attack being clearly present at first; and the interval of sanity has been even now longer than any such interval except that between the fifth and sixth attacks. The excitement disappeared as the patient showed signs of coming under the influence of the bromide and its constitutional symptoms were developed.

Periodic mania.—M. G—, æt. 56; a woman who has been rather weak-minded from birth, but got married and had children. She has been subject to attacks of excitement at intervals of a year or two for twenty years.

On her admission from another asylum, she was found to be a little thin woman, who went on talking quite incoherently, was rest-

less and destructive to her dress, and violent at times. Sometimes she refused her food, and had to be fed with the stomach pump. Though she got much food and stimulants she became quite run down, thin, and exhausted in mind and body before the attack was over. The first attack lasted from March till the following January; she had a short attack in April. In the beginning of the next year she had another short attack, and in the December following she had three epileptic fits (the first she ever had). They were the prelude to an attack of excitement which lasted for six months. In the following year she had another attack of excitement lasting for three months. In the beginning of this year she again became excited, and was put on drachm doses of bromide and tincture of Indian hemp, three times a day at first, and afterwards morning and evening. The medicine so completely moderated all the unpleasant symptoms of the excitement that she was kept in the infirmary ward among the sick patients. She was not noisy, destructive, and dirty in her habits as she had been before; she did not lose flesh to nearly the same extent as before, she took her food better than ever she had done before during excitement, and the attack terminated in September, leaving her far stronger than she had ever been before after a long attack of excitement.

This case illustrates the effect of the medicine on an old person very weak in body, and perhaps, therefore, more amenable to the effects of the drug. Such cases when violently excited in asylums, are far worse to manage, and cause far more anxiety than stronger patients, and, therefore, it is more important to have a mild and safe sedative.

Puerperal mania.—E. B—, æt. 33. This woman had been insane for four days, having been confined of her fifth child six weeks ago. She at first began to be suspicious and jealous of her husband, then became sleepless, restless, lost all interest in her children, and then got very violent.

On admission she was confused in mind, but soon became violently maniacal. Her temperature was 97.2° , pulse 92, strong; breasts full of milk. The usual measures were taken to stop the secretion of milk and relieve the breasts, and she was ordered a drachm of bromide of potassium and of tincture of cannabis every three hours during the day. By the end of a fortnight she was free from excitement, but was rambling in mind and full of queer constantly changing delusions. She ate and slept well most of the fortnight she was on the medicine. Her temperature fell to 96° . She has gone on improving, but rather slowly, and it was three months before the confused suspicious state of mind passed away. She often got, during that time, a drachm of the bromide at night for sleeplessness with the best effects. She now is almost well. Her recovery has been delayed by menorrhagia.

I am inclined to think I pushed the medicine too far in this case, and subdued the violent excitement too quickly. The prolonged after stage of confusion of mind, and the great fall in temperature, makes me think so; still the sedative effects were here most marked.

Melancholia with excitement and hallucination.—M. C—, æt. 60; a sempstress, unmarried, who had been insane for about three months. The immediate cause of her insanity is stated to have been a sudden shock which she received from a nephew shouting in her ear that he would kill her. She had “brain fever” twenty years ago, and is stated to have been rather “nervous” and irritable ever since. After the shock she got depressed in mind, and began to take fancies that people were going to hang her, that dogs were going to worry her on account of the crimes she imagined she had committed. She got so depressed in mind that she many times attempted to commit suicide by strangling herself. Had been sleepless. No hereditary predisposition to insanity.

On admission she was dull in mind, but quite coherent and rational on all points except that she said she was to be hanged. She was short and rather stout; tongue furred; pulse 96, very weak and thready; morning temperature 97.6° ; evening temperature 97.2° ; weight, $134\frac{1}{2}$ lbs. Her pupils are both contracted and her eyes suffused.

For the first month she got no medicine. During that time her average morning temperature was 98.1° , and her evening temperature 97° , and the pulse was 100 and remained weak. She ate pretty well, and gained $3\frac{1}{2}$ lbs. in weight in that time. She did not sleep well. Her delusions remained, and she got more depressed in mind. She was then put on one grain of opium three times a day. She slept better while taking this, but her depression of mind got worse. She had hallucinations of hearing, and after a fortnight the opium had to be given up. While taking it her temperature in the morning was 7° lower than it had been, and in the evening 1° higher, while her pulse was ten beats lower. She ceased to gain in weight after getting the opium. After this, various modes of treatment were adopted, and amongst others she got occasional doses of tincture of cannabis indica; but she continued to get worse and to lose in weight until, at April 1st, 1868, her state was the following:—“Is much excited, sleepless, restless by night and day, cannot employ herself in any way, imagines that she is to be hanged every minute, begs every one about her for a ‘reprieve,’ tries to get forcibly out of the ward door to get one; tries sometimes to commit suicide; says her brain is ‘on fire,’ and cries out, ‘My head, my head—I’m confused. I don’t know what I’m doing—I’m mad.’ Has lost a stone in weight.”

She still got worse, requiring stimulants to keep her up until the beginning of August, when she was put on drachm doses of bromide

of potassium thrice a day with scarcely any good effect. By way of experiment a drachm of tincture of cannabis Indica was added to each dose about the middle of August, and the effect of each dose of the mixture was quite marvellous. She at once became quiet, slept at night, took her food better, began to be industrious, and was sent to the convalescent ward, and to see whether this improvement was really due to the medicine it was discontinued and in two days she was nearly maniacal again. It was continued regularly for six weeks. She gained ten pounds in weight, and then began only to get a dose of the medicine when she felt her head getting confused. She used to ask for it to clear her head, and said its effects were "miraculous." She ceased to have the hallucinations. She remained in this state till December, requiring no medicine at times at all. At that time she began to get worse. She was then put on regular doses as before, and the attack was quite checked, but in January she got worse in mind and more stupid. She remained quiet till July following, getting the medicine regularly. It then lost some of its good effect, but still subdued the excitement.

It was through this case that my attention was first directed to the power of a mixture of tincture of cannabis and bromide of potassium to allay excitement of the brain. I never in my experience of over 2000 cases of insanity had seen anything so wonderful. It seemed a direct antidote to the morbid action of the cerebrum. I thought from the beginning that the woman had limited softening somewhere in the ganglia at the base of the brain. The contraction of the pupil, the small pulse, the hallucinations of hearing, and the unimpaired intelligence on many points seemed to point to some such lesion. If my diagnosis is correct, of course complete recovery could not have been expected. In no case in which I have given it since have I seen quite such good effects at once. Its sedative action I have seen as powerful, but it must be admitted that it is seldom, indeed, in therapeutics that we are able even temporarily to remedy a morbid action of the cerebrum so severe, so long continued, and so obstinate.

Insanity at the change of life.—A. H—, æt. 47, a married woman, who had lately ceased to menstruate, and who had been insane for three months; she had been restless, sleepless, noisy, complaining of all sorts of imaginary ailments, and had attempted to commit suicide.

On admission, she was depressed and restless looking. She complained of bodily weakness and many ailments. Pulse 75, good; temperature, morning, 97·3°, evening, 97·1°; weight, 130 pounds; no bodily disease to be discovered.

She remained from May till the following January in the state described. During that time she got various medicines, chlorodyne, Pil. Aloes et Fer.; quinine and iron, and Tr. Valer. co., but she got no

better. In January she was put on a grain of opium, three times a day. She was kept on this for about three months. It seemed to produce improvement, at first procuring sleep and allaying restlessness, but there was no permanent improvement in the mental depression. She lost six pounds in weight, and her average temperature rose $\cdot 9^{\circ}$ in the morning, remaining the same at night while on the opium. In April she was put on half-drachm doses of bromide of potassium at bedtime. This at once procured sound sleep, and after about a fortnight the restlessness and depression were visibly allayed so that she could settle to regular useful employment. The medicine was continued till July, when she had gained more than a stone in weight, and was apparently well in mind. As the case had been so long insane she was kept in the asylum till September, 1868, in case of a relapse, was then discharged recovered, and has kept well since.

This is a good example of the good effects of the bromide alone in climacteric insanity. It is usually subacute in its character, and does not require such large doses. I was beginning to despair of seeing any improvement in the case when the bromide was tried.

General paralysis.—T. D—, æt. 50, in the end of the first stage of general paralysis. Before admission he had been much excited, and had all the characteristic delusions of the disease about his immense wealth, &c.

On admission his speech was affected slightly, and he had all the most characteristic symptoms of general paralysis. He became worse rapidly, getting more and more excited. He was exceedingly noisy by day and night, filthy in his habits, and so constantly attacking and interfering with other patients and attendants that it was nearly an impossibility to prevent him from being injured. Indeed, on two occasions he was severely hurt by fellow patients. There seemed to be no alternative between almost constant seclusion and the risk of accidents. In this state he was put on a drachm and a half of the bromide with the same amount of the tincture of Indian hemp thrice a day, and after he had taken it for two days he became quite manageable. After about a fortnight it was found necessary to reduce the quantity of the bromide, on account of the persistent drowsiness and the furred tongue it was causing; but five-grain doses, however, were given until that attack had passed off, and with the same sedative influence.

This case is merely a type of general paralysis in the excited stage. Such a patient is, without exception, the most troublesome class of inmate of an asylum.

Summary.—1. The preceding observations consist of three parts. 1st. Experiments to determine the effect on maniacal excitement of

single doses of certain medicines, stimulants, and food. 2nd. Experiments to determine the effect on maniacal excitement of prolonged courses of certain neurotic medicines. 3rd. An account of clinical observations and experience of the effects of the same medicines in all kinds of insanity.

2. To compare the effect of opium on maniacal excitement, with that of bromide of potassium, with that of cannabis Indica, and with that of a mixture of bromide of potassium and cannabis Indica, and to compare the effect of these with that of a pure stimulant in large quantity, and with that of a nutritive food, eleven maniacal patients were treated with drachm doses of each of the medicines, and with four ounces of whisky, and the beef tea made from a pound of beef on successive days, and the results noted. Each experiment was repeated from fourteen to twenty-nine times.

3. A mixture of one drachm of bromide of potassium with one drachm of the tincture of cannabis Indica is more powerful to allay such excitement than any of the other drugs or stimulants tried. It is more uniform and certain in its effects, more lasting, interferes less with the appetite; and to produce the same effect the dose does not require to be increased after long-continued use.

4. Single doses of opium tended to raise the temperature and to lower the pulse; single doses of the mixture above-mentioned to lower the temperature and quicken and weaken the pulse, of bromide of potassium alone to raise the temperature and lower the pulse, of cannabis Indica alone to raise the temperature and quicken the pulse, of whisky to lower the temperature very much and slightly to quicken the pulse, and of beef tea to lower the temperature in the least degree and to lower and strengthen the pulse.

5. By giving bromide of potassium and cannabis Indica together, not only is the effect of either given separately immensely increased, but the combination has an essentially different action from either of them given alone.

6. Bromide of potassium alone can subdue the most violent maniacal excitement, but only when given in immense and dangerous quantities, and its effects are so cumulative while so given, that after they have once begun to appear they increase for days after the medicine has been stopped, almost paralysing the cerebrum and sympathetic.

7. To produce sleep in mild excitement, one drachm of the bromide of potassium is about equal to half a drachm of laudanum. To allay maniacal excitement, forty-five grains of the bromide and forty-five minims of the tincture cannabis are rather more than equivalent to a drachm of laudanum.

8. Seven cases of chronic mania were treated for twelve weeks with opium, in doses rising gradually from twenty-five minims of the tincture up to ninety minims three times a day, and the results

noted. After getting no medicine for several months the same cases were treated with a mixture of bromide of potassium and cannabis Indica in gradually increasing doses, and the results noted and compared with those of the opium treatment.

9. Under the opium treatment the patients all lost in weight continuously; their morning temperature was lowered and also their evening temperature, but the latter (which was too high, and its being high was a bad sign) very slightly, and their pulse was decreased in frequency. The opium allayed the excitement in the larger doses, but it soon lost its effect.

10. Under the bromide of potassium and cannabis Indica treatment the patients only lost in weight very slightly for the first six weeks, and after that they gained, their weight being more at the end of eight months' treatment than it was to begin with. Their appetites were not interfered with. Their temperature fell, especially their evening temperature, and the pulse was slightly increased in frequency and weakened in force, while the excitement was subdued, and the medicine showed no signs of losing its effect, even after being thus used for eight months. The maximum of good effects and the minimum of the ill effects of a sedative drug were thus obtained by using the bromide of potassium and the cannabis Indica in combination.

11. The bromide of potassium alone may be continued for months in doses of half a drachm three times a day, and the patients gain in weight and remain healthy in body, but the proper dose, whether given alone or along with cannabis Indica, varies greatly in different cases.

12. Cannabis Indica being a diuretic, and the bromide of potassium being carried off by the kidneys, it is probable that the former in that way helps to prevent the cumulative action of the latter when given alone.

13. When the two are given together, the first symptoms developed are those of the cannabis Indica, but these soon merge into a state of drowsy calmness of the nervous system which is in all respects the opposite of nervous irritability.

14. Fifty-one cases of various forms of insanity were treated by bromide of potassium alone or along with Indian hemp, and the results were that eighty per cent. of these were benefited more or less in some way, and twenty-five per cent. were most decidedly benefited.

15. The milder cases of puerperal and climacteric insanity were sometimes remarkably benefited by drachm doses of the bromide of potassium given at night.

16. In some of the cases of acute mania the excitement was subdued in a few days by the bromide combined with Indian hemp in doses of from half a drachm to a drachm of each given three times a day.

17. In some cases of periodic mania and general paralysis all the worst symptoms of maniacal excitement were allayed by giving a mixture of bromide of potassium and cannabis Indica in doses of from half a drachm to a drachm and a half of each three times a day. This was continued in one case for nine months with the best effect.

18. In three cases of periodic mania, attacks were cut short by a mixture of the two medicines, or by the bromide alone. In one of these complete recovery followed.

19. Fewer cases of simple melancholia were benefited by the bromide alone or along with Indian hemp than any other form of insanity. Some were made worse by them, but in one case of this disease where there was great excitement and hallucination of hearing and suspected organic disease of the brain, the combination gave immediate and complete relief of all the symptoms for four months.

20. One case of senile mania was successfully treated at home by a mixture of the bromide of potassium and tincture of cannabis Indica, when she was to have been sent to an asylum. It seems probable that some such cases, and also patients with short attacks of mania might be treated by the same medicines at home, when at present they have to be sent to lunatic asylums, on account of the want of such a safe and powerful sedative.

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